

***Indiana's academic standards for science contain six standards. Each standard is described below. On the pages that follow, age-appropriate concepts are listed underneath each standard. These ideas build a foundation for understanding the intent of each standard.***

## Standard 1 — The Nature of Science and Technology

It is the union of science and technology that forms the scientific endeavor and that makes it so successful. Although each of these human enterprises has a character and history of its own, each is dependent on and reinforces the other. This first standard draws portraits of science and technology that emphasize their roles in the scientific endeavor and reveal some of the similarities and connections between them. In order for students to truly understand the nature of science and technology, they must model the process of scientific investigation through inquiries, fieldwork, lab work, etc. Through these experiences, students will practice designing investigations and experiments, making observations, and formulating theories based on evidence.

## Standard 2 — Scientific Thinking

There are certain thinking skills associated with science, mathematics, and technology that young people need to develop during their school years. These are mostly, but not exclusively, mathematical and logical skills that are essential tools for both formal and informal learning and for a lifetime of participation in society as a whole. Good communication is also essential in order to both receive and disseminate information and to understand others' ideas as well as have one's own ideas understood. Writing, in the form of journals, essays, lab reports, procedural summaries, etc., should be an integral component of students' experiences in science.

## Standard 3 — The Physical Setting

One of the grand success stories of science is the unification of the physical universe. It turns out that all natural objects, events, and processes are connected to each other. This standard contains recommendations for basic knowledge about the overall structure of the universe and the physical principles on which it seems to run. This standard focuses on two principle subjects: the structure of the universe and the major processes that have shaped planet Earth, and the concepts with which science describes the physical world in general – organized under the headings of *Matter and Energy* and *Forces of Nature*. In Grade 1, students learn that objects continually move and change within the environment.

## Standard 4 — The Living Environment

People have long been curious about living things – how many different species there are, what they are like, how they relate to each other, and how they behave. Living organisms are made of the same components as all other matter, involve the same kinds of transformations of energy, and move using the same basic kinds of forces. Thus, all of the physical principles discussed in Standard 3 – The Physical Setting, apply to life as well as to stars, raindrops, and television sets. This standard offers recommendations on basic knowledge about how living things function and how they interact with one another and their environment. In Grade 1, students learn that a great diversity exists among plants and animals.

## Standard 5 — The Mathematical World

Mathematics is essentially a process of thinking that involves building and applying abstract, logically connected networks of ideas. These ideas often arise from the need to solve problems in science, technology, and everyday life — problems ranging from how to model certain aspects of a complex scientific problem to how to balance a checkbook.



## Standard 6 — Common Themes

Some important themes pervade science, mathematics, and technology and appear over and over again, whether we are looking at ancient civilization, the human body, or a comet. These ideas transcend disciplinary boundaries and prove fruitful in explanation, in theory, in observation, and in design. A focus on *Constancy and Change* within this standard provides students opportunities to engage in long-term and on-going laboratory and field work, and thus understand the role of change over time in studying The Physical Setting and The Living Environment.

Standard 1

# The Nature of Science and Technology

*Students are actively engaged in exploring how the world works. They explore, observe, count, collect, measure, compare, and ask questions. They discuss observations* and use tools to seek answers and solve problems. They share their findings.*

## Scientific Inquiry

1.1.1 Observe, describe, draw, and sort objects carefully to learn about them.

1.1.2 Investigate and make observations to seek answers to questions about the world, such as "In what ways do animals move?"

## The Scientific Enterprise

1.1.3 Recognize that and demonstrate how people can learn much about plants and animals by observing them closely over a period of time. Recognize also that care must be taken to know the needs of living things and how to provide for them.

## Technology and Science

1.1.4 Use tools, such as rulers and magnifiers, to investigate the world and make observations.

* observation: gaining information through the use of one or more of the senses, such as sight, smell, etc.

Standard 2

# Scientific Thinking

*Students begin to find answers to their questions about the world by using measurements, estimation, and observation as well as working with materials. They communicate with others through numbers, words, and drawings.*

## Computation and Estimation

1.2.1 Use whole numbers*, up to 100, in counting, identifying, measuring, and describing objects and experiences.

1.2.2 Use sums and differences of single-digit numbers in investigations and judge the reasonableness of the answers.

1.2.3 Explain to other students how to go about solving numerical problems.

* whole number: 0, 1, 2, 3, etc.

## Manipulation and Observation

1.2.4 Measure the length of objects having straight edges in inches, centimeters, or nonstandard units.

1.2.5 Demonstrate that magnifiers help people see things they could not see without them.

## Communication Skills

1.2.6 Describe and compare objects in terms of number, shape, texture, size, weight, color, and motion.

1.2.7 Write brief informational descriptions of a real object, person, place, or event using information from observations.

**Standard 3**

# The Physical Setting

*Students investigate, describe, and discuss their natural surroundings. They question why things move and change.*

## Earth and the Processes That Shape It

1.3.1 Recognize and explain that water can be a liquid or a solid and can go back and forth from one form to the other. Investigate by observing that if water is turned into ice and then the ice is allowed to melt, the amount of water is the same as it was before freezing.

1.3.2 Investigate by observing and then describe that water left in an open container disappears, but water in a closed container does not disappear.

## Matter and Energy

1.3.3 Investigate by observing and also measuring that the sun warms the land, air, and water.

## Forces of Nature

1.3.4 Investigate by observing and then describe how things move in many different ways, such as straight, zigzag, round-and-round, and back-and-forth.

1.3.5 Recognize that and demonstrate how things near Earth fall to the ground unless something holds them up.

Standard 4

# The Living Environment

*Students ask questions about a variety of living things and everyday events that can be answered through observations. They become aware of plant and animal interaction. They consider things and processes that plants and animals need to stay alive.*

## Diversity of Life

1.4.1 Identify when stories give attributes to plants and animals, such as the ability to speak, that they really do not have.

1.4.2 Observe and describe that there can be differences, such as size or markings, among the individuals within one kind of plant or animal group.

## Interdependence of Life

1.4.3 Observe and explain that animals eat plants or other animals for food.

1.4.4 Explain that most living things need water, food, and air.

Standard 5

# The Mathematical World

*Students apply mathematics in scientific contexts. They begin to use numbers for computing, estimating, naming, measuring, and communicating specific information. They make picture graphs and recognize patterns.*

## Numbers

1.5.1 Use numbers, up to 10, to place objects in order — such as first, second, and third — and to name them, such as bus numbers or phone numbers.

1.5.2 Make and use simple picture graphs to tell about observations.

## Shapes and Symbolic Relationships

1.5.3 Observe and describe similar patterns, such as shapes, designs, and events that may show up in nature, such as honeycombs, sunflowers, or shells. See similar patterns in the things people make, such as quilts, baskets, or pottery.

Standard 6

# Common Themes

*Students begin to understand how things are similar and how they are different. They look for what changes and what does not change and make comparisons.*

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## Models and Scale

1.6.1 Observe and describe that models, such as toys, are like the real things in some ways but different in others.

## Constancy and Change

1.6.2 Observe that and describe how certain things change in some ways and stay the same in others, such as in their color, size, and weight.